

Message

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Sent: 10/7/2021 6:14:00 PM
To: Adams, Glenn [Adams.Glenn@epa.gov]; Amoroso, Cathy [Amoroso.Cathy@epa.gov]; Alexander, Shanna [Alexander.Shanna@epa.gov]
Subject: 6 radionuclides being considered for monitoring/reporting only

This is my synopsis of the best reasons for these 6 radionuclides being in the monitor/report only category, if that's chosen.. remember TDEC would definitely prefer use BAT [ion exchange] if any rad is measured over the instream limits.. for all of these a given Waste Lot will identify if any of these are included, and thus hopefully prompt more scrutiny in landfill contact and leachate sampling.

C-14 – is rarely seen except in ORNL certain waste streams and is anticipated to be about 0.03% of the radiological inventory at closure (about 0.15% of the total radiological inventory at closure if operational losses are not credited). C-14 is also present everywhere in the environment from both natural and other causes. Historical upstream/background water/fish should prove this is the case.

C-60 – this radionuclide is low probability of being significant levels in waste streams due to its short half-life of 5.2 years, which means after 50+ years of ORNL operations there should be very low levels left in only ORNL waste streams

Pu-238, 239 – This actinide radionuclide is uniquely tied to space power sources, that ORNL used to support for NASA. As a conservative estimate, Pu-238 is anticipated to be about 4.8% of the EMDF radiological inventory at closure. Very low mobility in waste and the environment, which limits surface water concentrations. Pu-238 was detected in about 0.5% of EMWMF discharges from 2010 through 2020 (3 detects in 646 samples). The maximum detected activity observed at the EMWMF V-weir was 0.58 pCi/L, with an average of 0.022 pCi/L. This a bone seeker, and should be rarely seen in ORNL waste streams.

Pu239 – is the primary product for SRS production reactors, and some of the old research reactors at ORNL and is anticipated to be about 3% of the EMDF radiological inventory at closure. Very low mobility in waste and the environment, which limits surface water concentrations. Pu-239 is analyzed with Pu-240 due to the difficulty in separating low concentrations of the two isotopes analytically. Pu-239/240 was detected in about 2% of EMWMF discharges from 2010 through 2020 (13 detects in 645 samples). This is a bone seeker and should be rarely seen in ORNL and Y12 waste streams.

Cs137 – This is a very common fission product radionuclide that will be found in most waste streams from ORNL, and its longer half-life, 30 years, means it has not decayed much since 50s when operations started. This has a very low BCF because of its unique chemical based properties of absorbing in tissues and in the environment sediment and vegetation. Note it's the main contaminant in SRS historical site releases in sediment and streams. Keeping this as monitoring/report only is the most problematic. If the calculated water column PRG [1.2 pCi/L] and subsequent effluent discharge limit is within detection limit [DOE says theirs is 4 pCi/L]. using Ion Exchange if 1.2 pCi/L is exceeding would not reduce the levels any lower. So for this reason I'm ok with keeping this one monitor/report only. Note the MCL is 200 pCi/L, and that's a good benchmark/judgement I use to ascertain if a value may be significant or not.

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